

# Work Order ID 59328

Tuesday, June 01, 2010 11:44:45 AM

Page 1

Item ID: D350-748-141TRN

Accept

Revision ID:

Item Name: Crosstube Turning Detail

Start Date: 6/1/2010 Start Qty: 1.00

Required Date: 6/8/2010 Req'd Qty: 1.00

Cust Item ID:

Customer:

Reference:

Approvals: Process Plan: PS Date: 10-1-06 Tooling: \_\_\_\_\_ Date: \_\_\_\_\_  
QC: \_\_\_\_\_ Date: \_\_\_\_\_ SPC (Y/N): \_\_\_\_\_ Date: \_\_\_\_\_

Setup Start  
Stop  
Run Start  
Stop

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
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Draw Nbr	Revision Nbr
D350-748-141	Rev E

100	MORI SEIKI CNC LATHE LARGE	0.00							
Mori Seiki	Memo	0.00							
Mori Seiki CNC Lathe Large	1-Fill tube with sand & install plugs on both ends as per Folio FA648 2-Turn first side as per Folio FA648 3- File transition lines smooth.								

QA 10-06-07

110	QC1- Inspect dimensions to dimension sheet	0.00							
QC	Memo	0.00							
Quality Control									

QA 10-06-07

120	MORI SEIKI CNC LATHE LARGE	0.00							
Mori Seiki	Memo	0.00							
Mori Seiki CNC Lathe Large	1-Turn second side as per Folio FA648 2- File transition lines smooth. 3-Scribe Part & Batch as per Dwg D350-748-141								

QA 10-06-07

W/O:		WORK ORDER CHANGES						
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector	

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

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DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
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**NOTE:** Date & initial all entries

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Page 2

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QC: \_\_\_\_\_ Date: \_\_\_\_\_ SPC (Y/N): \_\_\_\_\_ Date: \_\_\_\_\_

Setup Start

Stop

Run Start

Stop

Sequence ID/  
Work Center IDOperation  
DescriptionSet Up/  
Run Hours

Tool ID

Tool #

Plan  
CodeAccept  
QtyReject  
QtyReject  
NumberInsp.  
Stamp

130

QC1- Inspect dimensions to dimension sheet

0.00



QC

Memo

0.00

Quality Control

A. H 10-06-07-0

140

QC8- Inspect parts - second check

0.00



QC

Memo

0.00

Quality Control

IX 10-06-10

150

Large Fab

0.00



Crosstubes

Memo

0.00

Crosstubes

Grind machining marks

1 - - AWW 10-06-10

W/O:		WORK ORDER CHANGES						
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Page 3

Item ID: D350-748-141TRN

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Setup

Start



Revision ID:

Item Name: Crosstube Turning Detail

Stop



Start Date: 6/1/2010 Start Qty: 1.00



Cust Item ID:

Required Date: 6/8/2010 Req'd Qty: 1.00



Customer:

Reference:

Approvals: Process Plan: \_\_\_\_\_ Date: \_\_\_\_\_ Tooling: \_\_\_\_\_ Date: \_\_\_\_\_

QC: \_\_\_\_\_ Date: \_\_\_\_\_ SPC (Y/N): \_\_\_\_\_ Date: \_\_\_\_\_

Run

Start



Stop

Sequence ID/  
Work Center IDOperation  
DescriptionSet Up/  
Run Hours

Tool ID

Tool #

Plan  
CodeAccept  
QtyReject  
QtyReject  
NumberInsp.  
Stamp

160



Outsource1

Outsource process - Heat Treat

0.00

Memo

0.00

Outsource process - Heat Treat

Issue P/O: 12209

Heat Treat to min 180 KSI As per Dwg D350-748-141

(MIL-T-6736 OR AMS 2759-1C)

Sand Blast tube after Heat Treat

Possible Supplier: Vac Aero

Ensure Certificate of Conformity is attached

CZ 10/7/06 @

170



Packaging

Receive &amp; Inspect for Damage &amp; Mat'l Certs

0.00

Memo

0.00

Packaging

Ensure certificate of conformaty is attached

C 10/7/12 @

180



QC

QC6- Inspect dimensions to drawing

0.00

Memo

0.00

Quality Control

S 10/6/123

@

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Page 4

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Setup Start



Revision ID:

Stop



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Cust Item ID:

Required Date: 6/8/2010 Req'd Qty: 1.00

Customer:

Reference:

Run Start



Stop



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Sequence ID/  
Work Center IDOperation  
DescriptionSet Up/  
Run Hours

Tool ID

Tool #

Plan  
CodeAccept  
QtyReject  
QtyReject  
NumberInsp.  
Stamp

190



Packaging

Packaging

0.00

Memo

0.00

Packaging

Identify and stock in kanban rack  
Location: 46

DP 108-5

200



QC

QC21- Final Inspection - Work Order Release

0.00

Memo

0.00

Quality Control

10/08/05

mf 10-8-05

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# Picklist Print

Tuesday, June 01, 2010 11:44:50 AM

Page 1

Work Order ID: 59328

Parent Item: D350-748-141TRN

Parent Item Name: Crosstube Turning Detail

Comments: IPP Rev:A New Issue 08-03-06 DD verified by:ec  
IPP Rev B Removed polish 08.04.02 EC verified by : DD  
IPP Rev C Remove LPS-3 08.06.23 EC verified by DD

Start Date: 6/1/2010

Start Qty: 1.00

Required Date: 6/8/2010

Required Qty: 1.00

Component Item ID/	Replacement	Mfg/	Bin	Primary	Last	Route	Unit of	Qty on	Qty per Kit	Total	Qty	Date	Status
D6017-115		Manufactured	No			110	Each	26.0000	1	1			



Crosstube Material

Location

Loc Qty

Loc Code

LG

26

32912

26

2.1 10-06-09

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

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**NOTE:** Date & initial all entries

<b>DART AEROSPACE LTD</b>		<b>Work Order:</b>	59328
<b>Description:</b> Crosstube Assembly (AS350/355 High Fwd)		<b>Part Number:</b>	D350-748-141
<b>Inspection Dwg:</b> D350-748-141 <b>Rev:</b> D		<b>Page 1 of 1</b>	

### FIRST ARTICLE INSPECTION CHECKLIST

☒ First Article ☐ Prototype

	Inspection Sheet Drawing Dimension	Tolerance	Actual Dimension	Accept	Reject	Method of Inspection	Comments
SIDE A	2.240	+0.005/-0.000	2.243	/			
	2.180	+0.005/-0.000	2.185	/			
	2.180	+0.005/-0.000	2.185	/			
	2.237	+0.005/-0.000	2.242	/			
	2.272	+0.005/-0.000	2.277	/			
	2.306	+0.005/-0.000	2.311	/			
	2.339	+0.005/-0.000	2.339	/			
	2.339	+0.005/-0.000	2.339	/			
	0.062	+/-0.010	0.062	/			
	4.26	+/-0.030	4.260	/			
	R0.063	+/-0.010	R0.063	/			
	R0.50	+/-0.030	R0.500	/			
SIDE B	2.240	+0.005/-0.000	2.243	/			
	2.180	+0.005/-0.000	2.185	/			
	2.180	+0.005/-0.000	2.185	/			
	2.237	+0.005/-0.000	2.242	/			
	2.272	+0.005/-0.000	2.277	/			
	2.306	+0.005/-0.000	2.311	/			
	2.339	+0.005/-0.000	2.339	/			
	2.339	+0.005/-0.000	2.339	/			
	0.062	+/-0.010	0.062	/			
	4.26	+/-0.030	4.260	/			
	R0.063	+/-0.010	R0.063	/			
	R0.50	+/-0.030	R0.500	/			
	110.27	+/-0.060	110.270	/			

<b>Measured by:</b>	A. H	<b>Audited by:</b>	MB	<b>Prototype Approval:</b>	N/A
<b>Date:</b>	10.06.07	<b>Date:</b>	10-06-10	<b>Date:</b>	N/A

Rev	Date	Change	Revised by	Approved
A	06.11.09	New Issue (P/O D350-748-101)	KJ/JLM	
B	07.10.24	Dwg Rev updated	KJ/EC/DD	

W/O:			WORK ORDER CHANGES					
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Item	Qty -141	Part Number	Description
1	X	D350-748-141	CROSSTUBE ASSEMBLY (AS 350/355 HI FWD)
2	1	D6017-115	CROSSTUBE
3	2	D3502-1	SUPPORT
4	2	D2856-400-710	ABRASION STRIP
5	1	AELS-1032-225	INSERT
6	1	NAS1149D0363J	WASHER (OR AN960JD10)
7	2	MS21920-20	CLAMP (PER DART SPEC. M-MS21920-20)
8	1	MS27039-1-10	SCREW

#### GENERAL NOTES:

- 1) MATERIAL: MANUFACTURED FROM D6017-115  
FINISHED LENGTH = 110.270±0.06
- 2) FINISH: MAGNETIC PARTICLE INSPECT PER DART QSI 038 4.2  
CADMIUM PLATE PER AMS-QQ-P-416B, CLASS 1, TYPE II  
PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2  
PAINT OUTSIDE PER DART QSI 005 4.2
- 3) TOLERANCES ARE PER DART QSI 018 UNLESS OTHERWISE NOTED.
- 4) UNITS: INCHES UNLESS OTHERWISE NOTED.
- 5) BREAK SHARP EDGES: 0.005 TO 0.010 MAX.
- 6) IDENTIFICATION: SCRIBE DART PART NUMBER "D350-748-141" AND BATCH NUMBER ON INSIDE OF CUFF USING VIBRATING STYLUS.
- 7) WEIGHT: 30.45 lbs
- 8) PART IS SYMMETRIC ABOUT CENTERLINE, EXCEPT FOR Ø0.297 HOLE.
- 9) BLEND OUT ALL EDGES FROM MACHINING LONGITUDINALLY, TRANSITION SHOULD BE SMOOTH.  
NOTE: ALL HOLES ARE DRILLED AFTER BENDING.
- 10) BEND PROGRESSIVELY WITH A MINIMUM OF 7 PASSES. MAXIMUM TUBE FLATTENING DUE TO BENDING IS 6% BASED ON O.D.
- 11) HEAT TREAT TO MIN. 180 KSI PER MIL-T-6736 OR AMS 2759-1C AFTER TURNING.
- 12) INSTALL D2856-400-710 ABRASION STRIPS WITH A GAP ON BOTTOM SIDE OF CROSSTUBE, CENTERED OPPOSITE D3502-1 SUPPORT, PER QSI 035.
- 13) EXTREME CARE MUST BE TAKEN TO PROTECT THE OUTSIDE SURFACE OF THE TUBE. THE OUTSIDE SURFACE MUST BE SMOOTH AND FREE FROM SURFACE DEFECTS SUCH AS SCRATCHES, NICKS, OR DENTS. DEFECTS UP TO 0.005" MAY BE BLENDED OUT LONGITUDINALLY. CIRCUMFERENTIAL GRIND MARKS ARE UNACCEPTABLE. WHEN DRILLING HOLES EXTREME CARE MUST BE TAKEN AND CAREFUL DEBURRING PERFORMED TO ENSURE A CLEAN HOLE WITH NO CRACKING/CHIPPING/GROOVES.
- 14) TORQUE CLAMPS 60 TO 80 IN-LB. ENSURE AT LEAST 1.5 THREADS SHOWING IN SAFETY AND THAT NUT HAS NOT BOTTOMED-OUT AFTER TORQUING.

SHOP COPY  
RETURN TO  
ENGINEERING  
UNCONTROLLED COPY  
SUBJECT TO AMENDMENT  
WITHOUT NOTICE  
WORK ORDER  
NO. 59328

*BS-0-4-01*

**RELEASED**  
2009-10-29

REV.	DESCRIPTION	BY	DATE
E	REVISE GENERAL NOTES; UPDATE TO CURRENT ADD STANDARDS; RELOCATED FLAG #6 PER PAR 06-046 (ZN A6-3); TOLERANCES (ZN C6-3, D1-3)	RF	09.09.30
D	MAG. PARTICLE AND CAD PLATE AS MFD.	CP	06.10.31
C	ADD CAD PLATING	CP	06.08.14
B	ADD D6017-115 & PRIME AND PAINT	CP	06.06.30
A	NEW ISSUE	CP	06.03.31
DESIGN	<i>Q</i>	<b>DART AEROSPACE LTD</b> HAWKESBURY, ONTARIO, CANADA DRAWING NO. D350-748-141 TITLE CROSSTUBE (AS 350/355 HI FWD) SCALE NTS DATE 09.09.30	
DRAWN	RF		
CHECKED	<i>Q</i>		
MFG. APPR.	<i>BS</i>		
APPROVED	<i>BS</i>		
DE APPR.	<i>BS</i>		

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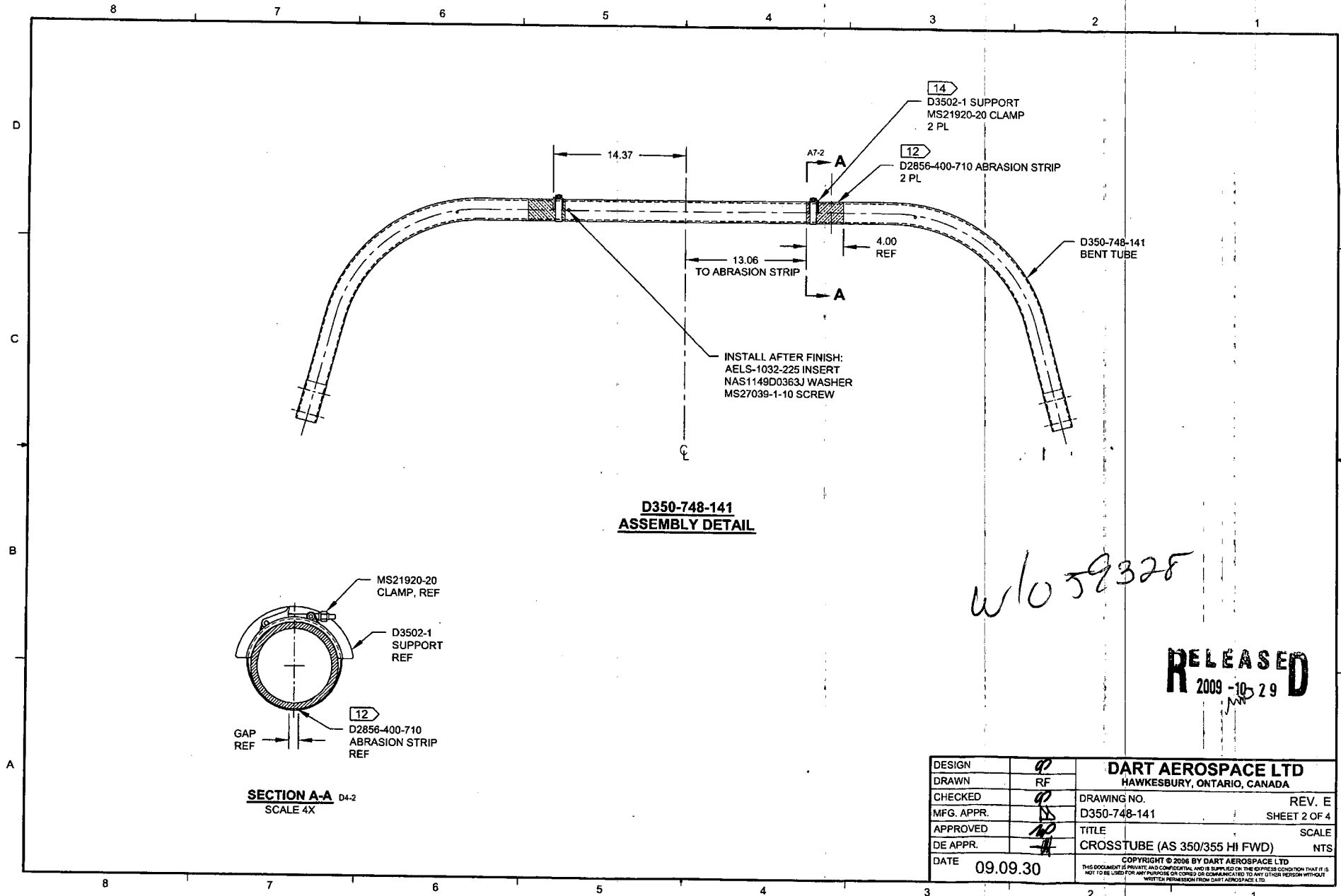
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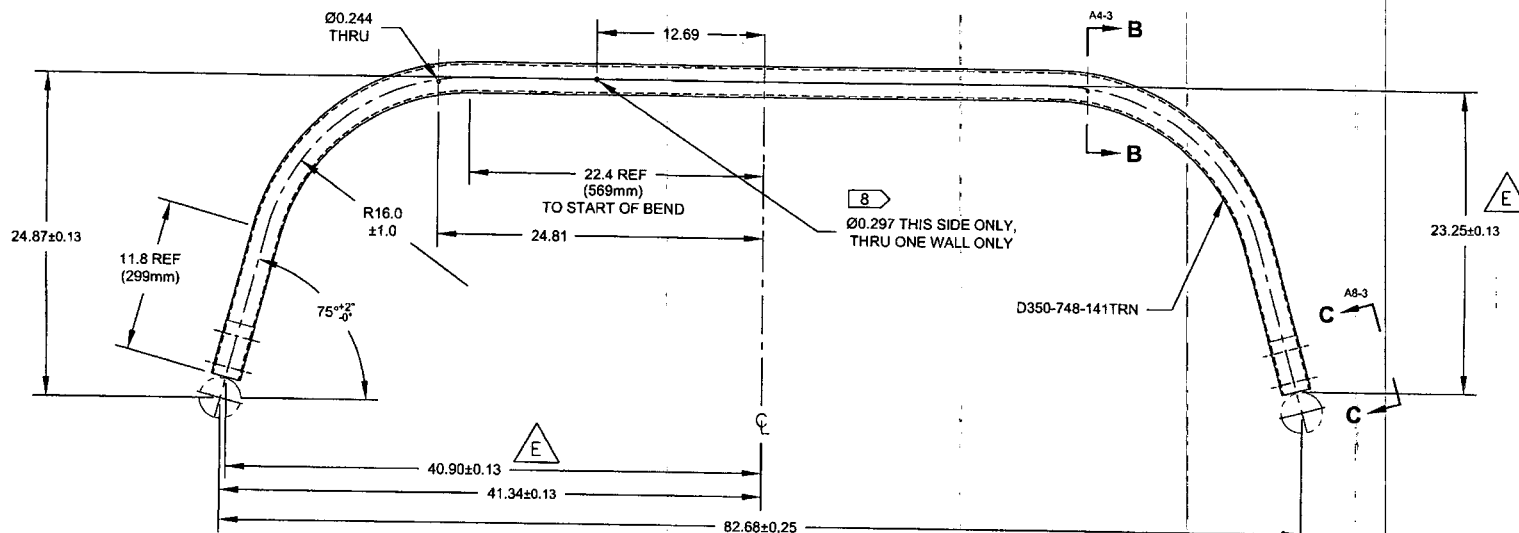
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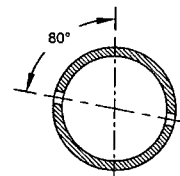
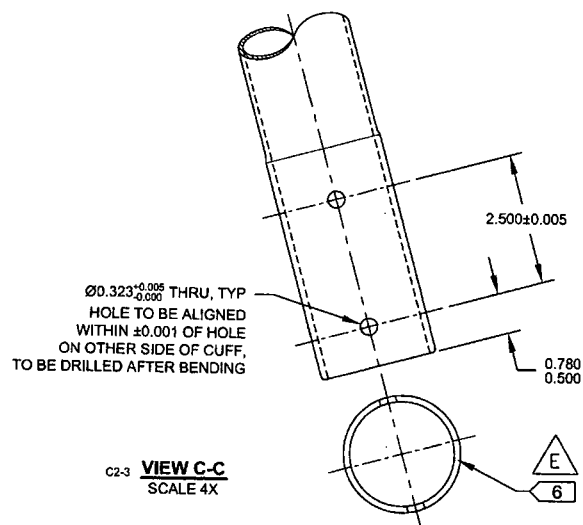
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**D350-748-141**  
**BENDING AND DRILLING DETAIL** 10



**SECTION B-B** D3-3  
 SCALE 4X

*w/o 5932F*

**RELEASED**  
 2009-10-29

DESIGN	Q	<b>DART AEROSPACE LTD</b>	
DRAWN	RF	HAWKESBURY, ONTARIO, CANADA	
CHECKED	Q	DRAWING NO.	REV. E
MFG. APPR.	Q	D350-748-141	SHEET 3 OF 4
APPROVED	Q	TITLE	SCALE
DE APPR.	Q	CROSSTUBE (AS 350/355 HI FWD)	NTS
DATE	09.09.30	COPYRIGHT © 2006 BY DART AEROSPACE LTD	
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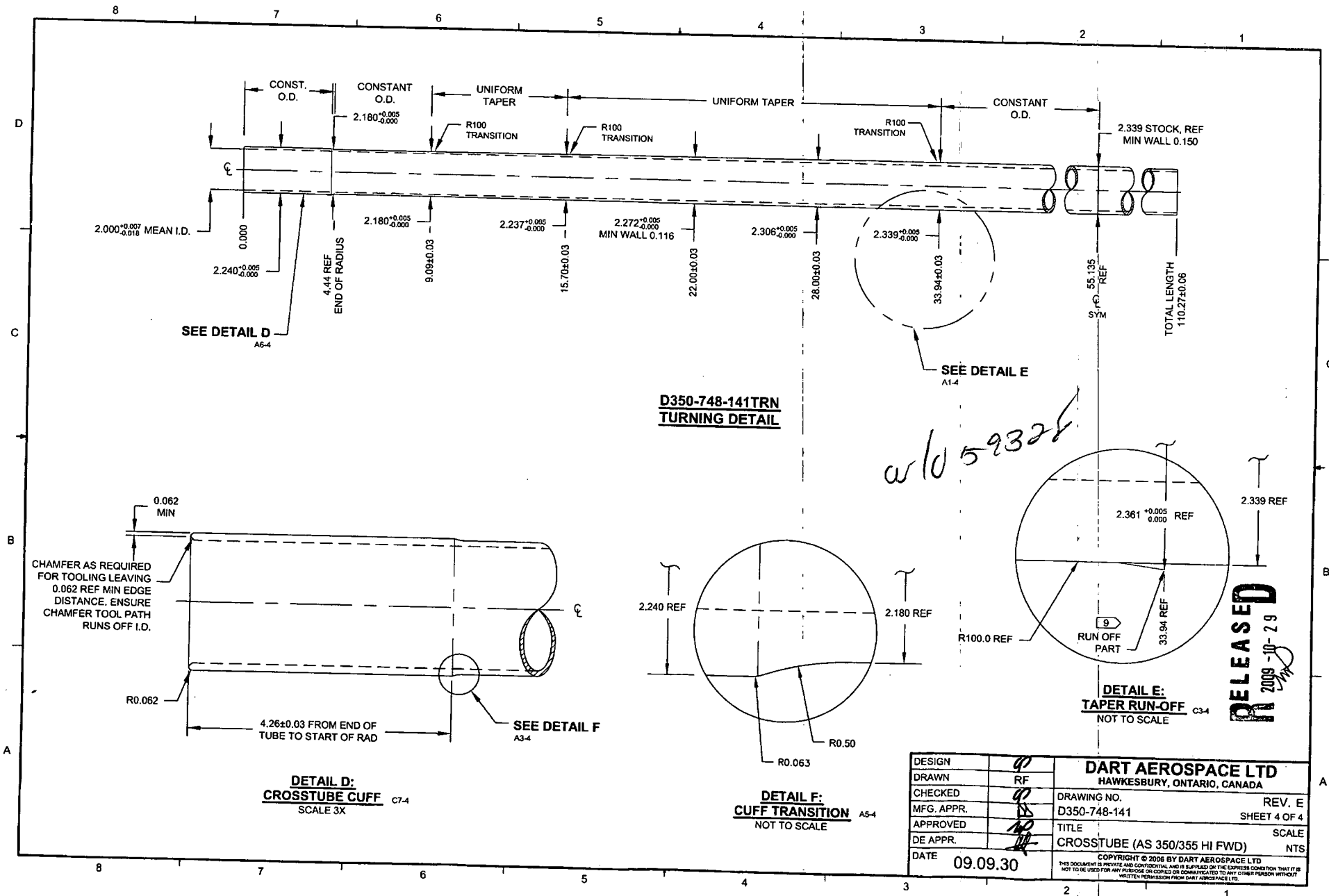
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CHECKED	RF	DRAWING NO.	REV. E
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APPROVED	RF	TITLE	SCALE
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VAC AERO  
INTERNATIONAL INC.

# RELEASE NOTE

GST No.: R105468102

OAK 121151-1

☒ HEAD OFFICE  
1371 SPEERS ROAD, OAKVILLE, ONTARIO  
CANADA L6L 2X5  
TEL: (905) 827-4171 FAX: (905) 827-7489

☐ 2009 WYECROFT ROAD, UNIT B  
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7450 RUE VERITÉ STREET, ST. LAURENT, QUÉBEC  
CANADA H4S 1C5  
TEL: (514) 334-4240 FAX: (514) 334-6269

07/16/2010

MM / DD / YYYY

PAGE: 1

1DAR01

ILL TO: DART AEROSPACE LTD.  
1270 ABERDEEN ST.  
HAWKESBURY, ON

SHIP TO: DART AEROSPACE LTD.  
1270 ABERDEEN ST.  
HAWKESBURY, ON

K6A 1K7

K6A 1K7

DATE SHIPPED	SHIP VIA	F.O.B.
07/16/2010		ORIGIN
CUSTOMER P/O No.	JOB No.	TERMS
PO12209		NET 30 DAYS

PART No.	DESCRIPTION	UOM	QTY ORD	QTY SHPD	TEST RESULTS
----------	-------------	-----	------------	-------------	--------------

D350-748 CROSS TUBE EA 16 16

Process Specifications: Procedure: 4353  
HEAT TREATED TO 140 KSI MIN. PER AMS 2759-1E  
100% HARDNESS TESTED AS PER ASTM E-18, 40-45 HRC  
MATERIAL: 4130  
SAND BLASTED AFTER HEAT TREAT

8/10/13

P/N: D350-748-141: 59325, 59326, 59327, 59328, 59329, 59330, 59331, 59332  
P/N: D350-748-241: 59586, 59588, 59589, 59549, 59587, 59550, 59551, 59552

100% HARDNESS TESTED

16 pcs

42/43 HRC



hereby certify that the material covered by this release note has been inspected and tested and conforms to all specifications relevant hereto in accordance with the conditions of the contract / or purchase order.

ON BEHALF OF VAC AERO INTERNATIONAL INC.



*Jane Robinson*  
Authorized Q.C. Inspector



VACUUM BRAZING - HEAT-TREATING - SPECIAL PROCESSING - FURNACE EQUIPMENT  
TURBINE COMPONENT OVERHAUL - PLASMA AND OTHER COATINGS

Heat Treating • Welding